

A.8 HIGH ENERGY ASTROPHYSICS

1. Scope of Program

This program element solicits basic research proposals to conduct investigations that are relevant to the NASA High Energy Astrophysics (HEA) Supporting Research and Technology (SR&T) program cluster that comprises the fields of x-ray and gamma-ray astronomy and cosmic-ray astrophysics. It is team-managed by all the Discipline Scientists involved in the individual cluster disciplines (see below). The primary goal of the HEA SR&T cluster is to obtain a better understanding of astrophysical objects and phenomena (other than the Sun, which is studied in another cluster) as revealed through their high-energy radiation characteristics.

Note that investigations relevant to the HEA cluster that fall into the following categories are not within the scope of this HEA SR&T solicitation, but may be proposed in response to solicitations for those categories in other program elements of this NRA:

- Theoretical investigations are solicited separately under the Astrophysical Theory program discussed in Appendix A.1.6 of this NRA;
- Projects directed mainly toward the analysis of archival data are solicited under the Astrophysics Data program discussed in Appendix A.1.4 of this NRA; and
- Proposals for laboratory astrophysics are solicited under the Space Astrophysics Research and Analysis program in Appendix A.7 of this Appendix.

2. X-Ray and Gamma Ray Astronomy

The purpose of the x-ray and gamma-ray astronomy SR&T program is to provide support for the flight program in these disciplines. In the context of this program, x-rays are defined as photons in the approximate energy range 0.1-30 keV, while gamma-rays are considered to lie in the energy range 30 keV-100 GeV. The HEA cluster SR&T Program provides support for basic research relevant to the design and development of instrumental concepts for future x-ray and gamma-ray astronomy missions and the conduct of scientific investigations via exposure of instrumentation carried on sounding rockets and high-altitude balloons. Proposed research may include ground-based observations of phenomena defined primarily by their high-energy characteristics, provided that such studies pertain directly to NASA HEA space missions. A list of current and planned x-ray and gamma-ray astronomy missions is given in Table 1 of this Appendix to serve as a guide in assessing the potential relevance of proposals for this program element.

3. Cosmic Ray Astrophysics

The Cosmic Ray Astrophysics discipline supports experimental studies related to understanding the origin, acceleration, and transport of galactic cosmic rays. Fundamental measurements include the elemental abundance, isotopic composition, and energy spectra of galactic cosmic rays, as well as antimatter, exotic particles, and dark matter to provide tests of theoretical models. This experimental program primarily supports science investigations utilizing large stratospheric balloons to carry instruments above about 99% of the Earth's atmosphere. The payloads funded over the past decade have been similar in many respects (e.g., level of technological sophistication, management approach, etc.) to space flight instruments for focused science investigations. **It should be noted that this program element does not support ground-based observations.** It may, however, support exploration and demonstration of new space-based instrument concepts pertinent to the science goals of the discipline.

All projects selected for this discipline must demonstrate high scientific merit and a credible plan for project completion, including the anticipated balloon flight requirements to carry out the project. The annual funding needs, the total project cost, the performance on recent, prior investigations (if applicable), and the extent to which an investigation contributes to the discipline's technological capability will be considered in selecting new investigations. All multiyear awards are contingent upon detailed progress reports and interim reviews that indicate sufficient progress was made in the previous year to warrant continued funding. The total out-year commitments, even though they are only tentative, must still allow for a stimulating future program of new investigations within the overall budget constraints. Based on past experience, at most only one new, major balloon mission is expected to be selected every three years. In rare cases, a 5-year award may be permitted to develop a completely new, highly meritorious mission through its first flight.

4. Programmatic Information

As a consequence of transitioning to annual reviews one year ago with the ROSS 2000 NRA, approximately one-quarter to one-third of the annual HEA SR&T cluster budget will be available for competition through this ROSS 2001 NRA for funding new (and extension of existing) three year projects commencing in FY 2002. It is anticipated that about \$3.8M will be available in Fiscal Year 2002 for investigations selected under this NRA, with similar numbers in succeeding years.

Special Instructions for Multi-institutional Proposals

Proposals for development of a sophisticated balloon or rocket payload for a focused scientific investigation frequently involves collaborations among several institutions. Such proposals should be in the form of individual investigation proposals, which may include Co-I's from the PI's home institution and/or from other institutions. As a primary criterion used in the evaluation of each proposal is the scientific merit of the investigation, it is important that all of the information required to perform that evaluation be concentrated in one place, without extraneous material relating to other investigations in which the PI or any Co-I's may be participating. There are two possible institutional arrangements:

- (1) If all Co-I's in an investigation are from the same institution as the PI, only a single proposal is to be submitted, whose page limit for its *Science/Technical/Management* section is increased to 20 pages instead of the default limit of 15 pages. In addition, it is important that the role of each Co-I be fully defined and the investigation budget include any budgets needed for those Co-I's;
- (2) For multi-institution investigations, *i.e.*, those with Co-I's from institutions other than that of the PI, each such institution must:
 - (a) Submit a task statement, not to exceed five pages, as an appendix to the PI's proposal describing the contribution by that Co-I institution to the investigation, the roles and responsibilities of the Co-I(s) (if more than one, define a single Lead Co-I for that institution), and a summary budget for the task; **and**,
 - (b) Submit the same five page task statement and a detailed budget as a separate proposal directly to NASA from that Co-I institution. This Co-I proposal must be authorized by the appropriate institutional representative and must contain all the forms and documentation required for a stand-alone proposal. This Co-I proposal must include a clear cross-reference to the PI proposal, and the Lead Co-I identified in the PI proposal should serve as the "Institutional PI" for this proposal.

Regardless of the institutional affiliation(s) of any Co-I(s), the only proposal that will be reviewed is that from the PI for the entire investigation. Therefore, the proposed Co-I activities will not be considered for funding independent of the overall investigation submitted by the relevant PI. Conversely, NASA reserves the right to select all, some, or none of the Co-I's that may be proposed as part of an investigation. Cases involving partial or non-selections of Co-I's by NASA will be negotiated with the PI prior to final selection.

If such a multi-institutional investigation is selected for funding, separate awards will generally be made to each institution involved in the investigation, with a Lead Co-I from each non-PI institution serving as the "Institutional PI" for the award to that Co-I institution. Alternatively, at the request of the PI and with the concurrence of the Lead Co-I from a separate institution, a sub-contracting arrangement between the PI institution and that Co-I institution may also be proposed.

IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) is now using a single, unified set of instructions for the submission of proposals. This material is contained in the document entitled *OSS Guidebook for Proposers Responding to NASA Research Announcement – 2001* (or “*OSS Guidebook – 2001*” for short) that is accessible by opening “Research Opportunities and Data” from the menu at URL <http://spacescience.nasa.gov> , or directly at URL <http://spacescience.nasa.gov/research/ossguidebook/> . This NRA’s *Summary of Solicitation* also contains the schedule and instructions for the electronic submission of a Notice of Intent (NOI) to propose and a proposal’s *Cover Page/Proposal Summary*, for electronic access to the required *Budget Summary* form, and the mailing address for the submission of a proposal.

In addition, because of the greater complexity of experimental project proposals for this cluster, the *Science/Technical/Management* section of such proposals may be 20 pages long instead of the default 15 pages and 20 copies plus the signed original of the proposal should be submitted instead of the default number of 15.

Questions concerning the X-Ray and Gamma Ray Astronomy program may be directed to:

Dr. Louis J. Kaluzienski
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546
Telephone: 202-358-0365
E-mail: lkaluzie@hq.nasa.gov

Questions concerning Cosmic Ray Astrophysics program may be addressed to:

Dr. W. Vernon Jones
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546
Telephone: 202-358-0885
E-mail: w.vernon.jones@hq.nasa.gov

Table 1 - Current and Planned NASA X- and Gamma-ray Astronomy Missions
relevant to the HEA Cluster SR&T Program

MISSION	PRIMARY EMPHASIS
• Rossi X-ray Timing Explorer (RXTE)	Spectrophotometric observations of selected cosmic x-ray sources.
• Chandra X-ray Observatory (CXO)	High-resolution imaging/spectroscopic observations of selected cosmic x-ray sources.
• X-ray Multi-Mirror Mission* (XMM-Newton)	High-throughput, moderate-resolution imaging/spectroscopic observations of selected cosmic x-ray sources.
• Constellation X	High throughput, high resolution spectroscopic observations of selected cosmic x-ray sources.
• Milli-Arcsecond X-ray Imaging Mission (MAXIM)	Very high resolution imaging observations of cosmic x-ray sources.
• Global Geospace Program (GGS [Wind/TGRS/Konus])	Gamma-ray burst spectroscopy.
• High-Energy Transient Experiment (HETE-II)	Gamma-ray burst position determination.
• INTEGRAL*	High-resolution gamma-ray spectroscopy.
• GLAST	High-throughput, high energy gamma-ray observations of cosmic gamma-ray sources.
• Swift	Gamma-ray burst position determination.
• Energetic X-ray Imaging Space Telescope (EXIST)	Hard X-ray all-sky survey.
* International Collaboration	

**RESEARCH OPPORTUNITIES IN SPACE SCIENCE - 2001
(ROSS-2001)**

NASA Research Announcement
Soliciting Basic Research Proposals

NRA 01-OSS-01
Issued: January 26, 2001

Proposals Due
Starting April 6, 2001,
and Ending November 9, 2001

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

RESEARCH OPPORTUNITIES IN SPACE SCIENCE - 2001 (ROSS-2001)

SUMMARY OF SOLICITATION

• INTRODUCTION AND GENERAL POLICIES

The stated mission of the Space Science Enterprise of the National Aeronautics and Space Administration (NASA) is to solve the mysteries of the universe, to explore the solar system, to discover planets around other stars, and to search for life beyond Earth. To carry out this mission, NASA's Office of Space Science (OSS) sponsors a broad range of research programs relevant to its four Science Themes, which are defined as:

- *Astronomical Search for Origins and Planetary Systems (ASO)* that addresses the origins of galaxies, stars, proto-planetary and extra-solar planetary systems, Earth-like planets, and the origin of life;
- *Solar System Exploration* (abbreviated as ESS) that seeks to understand all aspects of our Solar System, including the planets, satellites, small bodies, and solar system materials, and the search for possible habitats of life beyond Earth;
- *Structure and Evolution of the Universe (SEU)* that involves the study of cosmology, the large scale structure of the universe, the evolution of stars and galaxies, including the Milky Way and objects with extreme physical conditions, and an examination of the ultimate limits of gravity and energy in the Universe; and
- *The Sun-Earth Connection (SEC)* that concerns the Sun as a typical star and as the controlling agent of the space environment of the Solar System, especially the Earth.

Stated informally, these four themes seek to answer four fundamental questions, "How did the Universe begin and evolve?" "Where did we come from?" "Where are we going?" and "Are we alone?" Further information about these themes as well as access to the most recent Strategic Plans (as of late 2000) for both NASA and OSS may be found through the OSS homepage on the World Wide Web at <http://spacescience.nasa.gov>. In addition, this NRA may be found through the menu listings "*Research Opportunities and Data/OPEN Opportunities*" at this same Web site.

OSS pursues these fundamental science themes using a wide variety of both space flight programs and investigations in basic science and technology. This current NASA Research Announcement (NRA) ROSS-2001 solicits proposals for Supporting Research and Technology (SR&T) investigations that seek to understand naturally occurring space phenomena and space science-related technologies across a full range of science subdisciplines relevant to OSS interests. These program elements are listed in the index to Appendix A at the

end of this Summary of Solicitation. Table 1 lists these program elements in the order of their respective due dates for the submission of proposals, while Table 2 lists them in according to their order shown in Appendix A. As a guide to their relationships, Tables 1 and 2 also cross references these program elements to the OSS Science Themes as noted above. Appendix A contains detailed descriptions of each element, and questions about each may be directed to their respective Discipline Scientists who are identified in the section entitled “Programmatic Information” that concludes the description of each program element.

Beginning with the ROSS NRA issued in February 2000 (NRA 00-OSS-01), the program elements offered through this series of solicitations have been grouped into nine “clusters” as indicated in the Table of Contents of Appendix A at the end of this Summary of Solicitation. It is a goal to group the due dates for proposals for the program elements within each cluster closely together in time to allow for the possibility of the reallocation of funding within a cluster once all its related proposals are reviewed. In addition, recommendations from a comparative review of all clusters in mid-2001 will be used to help determine the cluster structure and content, as well as funding allocations for Fiscal Year's 2002-2004 (October 1, 2001, through September 30, 2003). Questions about this evolving approach to the structure and review of the OSS SR&T program may be sent to:

Dr. Guenter R. Riegler
Director
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington, DC 20546-0001
Telephone: 202-358-1588
E-mail: guenter.riegler@hq.nasa.gov
Facsimile: 202-358-3097

Although Tables 1 and 2 effectively cross-references these newly defined clusters to many of the traditional ROSS Program Elements and the four OSS Science Themes, the section entitled “INTRODUCTION AND OVERVIEW” of Appendix A also provides additional narrative material that expands on these relationships. Therefore, anyone interested in applying to this NRA is urged to read the relevant parts of this introductory section to Appendix A for a full understanding of whether their research interests are relevant to NASA OSS interests, and, if so, to which cluster and program element their proposal should be submitted. It is especially important to note that the overall objective of each of these program elements to contribute as effectively and directly as possible to the achievement of OSS strategic goals. Therefore, priority for selection will be given to those proposals that most clearly demonstrate the potential for making such contribution (see also the discussion of the evaluation criteria below).

Recommendations for funding for the proposals submitted to this NRA will be based on the peer evaluation of each proposal's intrinsic merit, its relevance to NASA's objectives, and its cost. For the purposes of this NRA: (i) by intrinsic merit is meant the proposal's science and technical merits, the capabilities of the proposing institution, the qualifications of the proposing personnel, and the overall standing of the proposal among similar proposals and/or evaluation against the state-of-the-art; (ii) by relevance to NASA's objectives is meant the proposal's relevance to the objectives of the OSS science program element as described in this NRA to which the proposal is submitted; and (iii) by cost is meant the reasonableness and realism of the proposal's requested budget, in addition to its size. In all cases, the Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment can be made and upon the receipt of proposals in response to this NRA that NASA determines are acceptable for award.

Participation in this program is open to all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit institutions, NASA Centers, and other Government agencies. Historically Black Colleges and Universities (HBCU's), other minority educational institutions, and small businesses and organizations owned and controlled by socially and economically disadvantaged individuals or women are particularly encouraged to apply. Participation by non-U.S. organizations in this program is encouraged subject to NASA's policy of no-exchange-of-funds (see further information in the "*OSS Guidebook for Proposers...*" discussed below).

- NEW INSTRUCTIONS FOR PREPARATION/SUBMISSION OF PROPOSALS

Starting in 1998, the Office of Space Science began to use a single, unified set of instructions for the submission of proposals for almost all of its NRA's that were incorporated into each NRA. Such standardization has proven to be of significant value to NASA to help ensure the uniform handling and processing of submitted proposals, as well as to researchers interested in responding to multiple program elements within the ROSS NRA's, or even different OSS NRA's. However, starting with this ROSS-2001 NRA, these proposal policies and procedures, as well as those for NASA's review and selection of proposals for funding, are now described in a separate document entitled "*Office of Space Science (OSS) Guidebook for Proposers Responding to NASA Research Announcement – January 2001*" (abbreviated as "*OSS Guidebook – 2001*") that is accessible by opening "*Research Opportunities and Data*" from the menu at the World Wide Web URL <http://space.science.nasa.gov>, or may be directly accessed at URL <http://space.science.nasa.gov/research/ossguidebook/>.

By reference, this *OSS Guidebook – 2001* is hereby incorporated into this ROSS-2001 NRA, and proposers to this NRA are responsible for understanding and complying with its procedures before preparing and submitting their proposals. In particular, its Chapter 2 ("Proposal Preparation and Organization") and Chapter 3 ("Proposal Submission Procedures") largely

replace the contents of “Chapter C” in most OSS NRA's issued during the previous three years. Proposers familiar with these past OSS NRA's will find that these instructions are essentially unchanged from those introduced starting in 1998. Also, note that the NASA-required proposal *Budget Summary* form is now available electronically through the Web site designated for the *Cover Page/Proposal Summary* (see Summary Information below) for printing in hard copy for submission with the hard copies of the proposal. The other chapters and appendices of this *OSS Guidebook – 2001* provide supplemental information about the entire NRA process, including NASA policies for the solicitation of proposals (including those involving non-U.S. participation), guidelines for writing complete and effective proposals, the NASA policies and procedures for the proposal review and selection processes, and for issuing and managing the awards to the institutions that submitted selected proposals, and Frequently Asked Questions (FAQ's) about a variety of proposal and award processes and procedures.

Comments and suggestions of any nature about this *OSS Guidebook – 2001* are encouraged and welcomed and may be directed at any time to Dr. David Bohlin, Research Program Management Division, Code SR, Office of Space Science, NASA Headquarters, Washington, DC 20546-0001; telephone: (202) 358-0880; E-mail: david.bohlin@hq.nasa.gov (if submitted by E-mail, use "Proposer's Guidebook" as the Subject of the message).

The World Wide Web site for submitting both a Notice of Intent (NOI) to propose and a proposal's *Cover Page/Proposal Summary* is given in the Summary Information below (Chapters 2 and 3 of the *OSS Guidebook – 2001* as discussed above contains detailed information about these two items). This Web site will be open for the submission of NOI's for any given program element in this NRA for typically 30 days, starting about 90 days before the proposal due date, and the site will be open for the submission of the other required proposal materials starting about 45 days before the proposal due date (see Tables 1 and 2 below for all schedules). A point of contact for assistance in accessing and/or using this Web site is given in the Summary Information below.

- OSS EDUCATION AND PUBLIC OUTREACH (E/PO) PROGRAM

OSS policy continues to strongly encourage participation by the space science community in education and public outreach activities with the goal of enhancing the Nation's formal education system and contributing to the broad public understanding of science, mathematics, and technology. A significant national program in space science education and outreach is now underway, and OSS's demonstrated contributions to education and outreach have now become an important part of the broader justification for the public support of space science (for further details open “*Education and Public Outreach*” on the OSS homepage at <http://spacescience.nasa.gov>).

Since 1998 when it started to offer the opportunity to propose E/PO activities in conjunction with its NRA's, the Office of Space Science has received many constructive comments from

members of the space science community as to how to improve its efforts to involve space scientists in education and public outreach. Based on the experience of the past few years and these comments, OSS is making a number of important changes in procedure this year. In particular, starting with this OSS ROSS-2001 NRA, E/PO proposals will be solicited only from those proposers whose research proposals have been already selected for an award. This change should decrease the overall workload on the space science community, increase the likelihood that more E/PO proposals of merit will be funded, and more effectively encourage successful science proposers to add an E/PO component to their research effort.

Therefore, only those proposers to this NRA who are eventually selected on the basis of the excellence of their research awards will be eligible to propose a supplemental E/PO program in accord with the OSS E/PO policies and guidelines. At the time of the release of this NRA it is anticipated that selected Principal Investigators will have two windows of opportunity to submit an E/PO proposal, either: (i) no later than 45 days after the date of the letter of selection of their parent research proposal, with the anticipation of starting the proposed E/PO activity within the first third of the first year of parent research award; or (ii) no later than 75 days before the yearly anniversary date of their award, with the anticipation of starting the proposed E/PO activity in conjunction with next yearly funding supplement of their multiple year award. In either case, consistent with the past E/PO policies and to ease the burden of NASA's administration of these supplemental awards, the total period of performance of an E/PO award will be restricted to that of its parent research award.

The current description of the underlying strategy and implementation plans for the OSS E/PO program may be found through the menu item *Education and Public Outreach* on the OSS homepage at <http://spacescience.nasa.gov>. The specific policies and procedures for writing and submitting supplemental E/PO proposals in conjunction with proposals selected through this NRA will be posted no later than the end of July 2001, which will be sufficiently early to allow those selected for the program elements with the earliest proposal due dates (see Table 1 below) to organize and submit an E/PO proposal. Questions and/or comments about this OSS E/PO program are sincerely welcomed and may be directed to Dr. David Bohlin, Research Program Management Division, Code SR, Office of Space Science, NASA Headquarters, Washington, DC 20546-0001 (telephone: 202-358-0880; E-mail: david.bohlin@hq.nasa.gov)

- ITEMS OF SPECIAL IMPORTANCE FOR THIS NRA

(1) Because this ROSS-2001 NRA is being released far in advance of many of the deadlines given in Tables 1 or 2, additional programmatic information for any given entry may develop before proposals are due. If so, such material will be added as an Amendment to this NRA as posted at its NRA Web site no later than 30 days before the proposal deadline. Although NASA OSS will also send an electronic alert of any such amendments to all subscribers of its electronic notification system (see Special Note (3) below), it is the

responsibility of prospective proposers to check this NRA Web site for updates concerning the program element(s) and/or cluster(s) of interest.

(2) OSS now requires the electronic submission of certain key elements of proposals through the World Wide Web (see below in the Summary Information), and this practice continues with this NRA. While every effort is made to ensure the reliability and ease of accessibility of this Web site, and to maintain a point of contact for assistance via E-mail, difficulty in accessing and/or using this site may arise at any point on the Internet including the user's own equipment. Therefore, prospective proposers are urged to familiarize themselves with this site and to submit the required proposal materials well in advance of the deadline(s) of the program element(s) of interest.

(3) OSS maintains an electronic notification system to alert interested subscribers of the impending release of its research program announcements. Subscription to this service is accomplished through the menu item *Get E-mail Announcements* on the OSS home page at <http://spacescience.nasa.gov> by following the instructions for *Space Science Research Announcements*. Owing to the increasingly multidisciplinary nature of OSS programs, this electronic service will notify subscribers of all future NASA OSS program announcements regardless of its type and objective (10 to 15 per year). Regardless of whether this service is subscribed to or not, all OSS research announcements may be accessed from the Web as soon as they are posted (about 8:30 a.m. Eastern Time on the day of release) through *Research Opportunities and Data* on the OSS homepage.

- SUMMARY INFORMATION APPLICABLE TO THIS NRA

- Program alphanumeric identifier: NRA 01-OSS-01
- Date of NRA issue: January 26, 2001

- Guidance for preparation and submission of proposals:

“OSS Guidebook for Proposers – 2001” at URL
<http://spacescience.nasa.gov/research/ossguidebook/>

- Submission of Notice of Intent (NOI) to propose:

- Due date: See Table 1 or 2 below for program element of interest (typically 60 days prior to the Proposal Deadline)

- Web site for electronic submission: <http://props.oss.hq.nasa.gov>
 (contact for help: deb.tripp@hq.nasa.gov)

- Electronic submission of the proposal’s Cover Page/Proposal Summary:

- Deadline: See Table 1 or 2 below for program element of interest.

- Web site for electronic submission: <http://props.oss.hq.nasa.gov> (open for submissions starting about 45 days in advance of proposal due date for each program element; (contact for help: deb.tripp@hq.nasa.gov)

- Web site for download of proposal Budget Summary form:

<http://props.oss.hq.nasa.gov>
 (contact for help: deb.tripp@hq.nasa.gov)

- Submission of hard copy of proposals:

- Page limits: Default values are given in Section 2.3 of “OSS Guidebook – 2001” (unless otherwise specified in Appendix A of this NRA).

- Required number: Signed original plus 15 copies (unless otherwise specified in Appendix A of this NRA).

- Deadlines: 5 p.m. Eastern Time on dates in Table 1 or 2 below.

- Address for submission by US Postal Service, commercial delivery, or courier:

Name of Program Element
ROSS-2001 NRA
NASA Peer Review Services
Suite 200
500 E Street, SW
Washington, DC 20024
Telephone: (202) 479-9030

- Selecting Official: Director or Deputy Director
Research Program Management Division
Office of Space Science
- Announcement of selections: Goal: 150 days after proposal due date.
- Initiation of funding for new awards: Goal: 46 days after proposal selection.
- Further information:
 - Specific science program elements: Discipline Scientist listed for each program element in Appendix A.
 - General NRA policies and procedures: Dr. David Bohlin
Research Program Management Division
Code SR
Office of Space Science
National Aeronautics and Space
Administration
Washington, DC 20546-0001
Phone: (202) 358-0880
E-mail: david.bohlin@hq.nasa.gov

Your interest and cooperation in responding to this ROSS-2001 NRA are appreciated. Comments about the inclusive nature and/or structure of this NRA for the OSS supporting research and analysis programs are welcome and may be directed to either the Discipline Scientists identified for each program element in Appendix A or to the point of contact for General NRA Procedures identified above.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe

Jay Bergstralh
Acting Science Program Director
Solar System Exploration

Anne L. Kinney
Science Program Director
Astronomical Search for Origins
and Planetary Systems

George L. Withbroe
Science Program Director
The Sun-Earth Connection

APPENDIX A.	<u>DESCRIPTION OF PROGRAM OPPORTUNITY</u>	<u>Page</u>
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TABLE 1

SCIENCE PROGRAM ELEMENTS SOLICITED IN THE ROSS-2001 NRA
(in order of the proposal due dates)

Cluster	NRA Appendix	Science Program Element (see Appendix A)	NOI Due Date	Proposal Due Date	Relevant OSS Science Themes [1]			
					ASO	SEU	ESS	SEC
A.8	A .8.1	X-ray and Gamma-ray Astrophysics	2/23/01	4/06/01		X		
A.8	A.8.2	Cosmic Ray Astrophysics	2/23/01	4/06/01		X		
A.1	A.1.2	Sun-Earth Connection Guest Investigator	2/23/01	4/20/01				X
A.5	A.5.3	Planetary Atmospheres [2]	2/23/01	4/20/01			X	
A.5	A.5.4	Planetary Suborbital Research	2/13/01	4/20/01			X	
A.1	A.1.1	Sun-Earth Connection Theory	3/02/01	4/27/01				X
A.1	A.1.4	Astrophysics Data	3/02/01	5/04/01	X	X	X	
A.1	A.1.5	Long-Term Space Astrophysics	3/02/01	5/04/01	X	X	X	
A.4	A.4.2	Planetary Geology and Geophysics [2]	3/09/01	5/10/01			X	
A.4	A.4.1	Cosmochemistry [2]	3/23/01	5/18/01	X		X	
A.4	A.4.3	Origins of Solar Systems	3/30/01	6/01/01	X		X	
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A.5	A.5.2	Near Earth Object Observations	4/13/01	6/15/01	X		X	

A.7	A.7	Space Astrophysics Research and Analysis [3]	4/06/01	6/21/01	X	X		
A.3	A.3	Geospace Sciences [4]	5/02/01	6/22/01			X	X
A.1	A.1.6	Astrophysics Theory	5/25/01	7/20/01	X	X		
A.6	A.6.1	Exobiology [2]	6/08/01	8/03/01	X		X	
A.6	A.6.2	Planetary Instrument Definition and Development	6/07/01	8/08/01			X	
A.2	A.2	Solar and Heliospheric Physics	6/22/01	8/24/01				X
A.4	A.4.4	Mars Data Analysis	7/06/01	8/31/01			X	
A.1	A.1.3	Living With a Star Targeted Research and Technology	7/18/01	9/19/01				X
A.9	A.9.1	Applied Information Systems Research	7/27/01	9/26/01	X	X	X	X
A.5	A.6.4	Astrobiology Science and Technology	9/14/01	11/09/01	X		X	
A.6	A.6.3	Planetary Major Equipment [2]	See ESS Program Element of interest. [2]		X		X	
A.5	A.4.5	Discovery Sample Return Lab. Instruments and Data Analysis	TBD	TBD	X		X	

[1] ASO: Astronomical Search for Origins; SEU: Structure and Evolution of the Universe; ESS: Solar System Exploration; SEC: The Sun-Earth Connection.

[2] The proposals for Planetary Major Equipment program element A.6.3 may be submitted in conjunction with program elements A.4.1: Cosmochemistry; A.4.2: Planetary Geology and Geophysics; A.5.1: Planetary Astronomy; A.5.3: Planetary Atmospheres; and A.6.1 Exobiology.

[3] The Space Astrophysics Research and Analysis cluster includes the following program elements that were separately identified in the ROSS-1998 and -1999 NRA's: Ultraviolet, Visible, and Gravitational Astrophysics; Infrared/Submillimeter/Radio/Interferometry Astronomy; Space Astrophysics Detectors; and Astrophysics Suborbital.

[4] The Geospace Sciences cluster includes the following program elements that were separately identified in previous ROSS-1998 and -1999 NRA's: Ionospheric, Thermospheric, and Mesospheric (ITM) Physics; Magnetosphere Physics; and Magnetospheric and ITM Low Cost Access to Space.

TABLE 2

SCIENCE PROGRAM ELEMENTS SOLICITED IN THE ROSS-2001 NRA
(in order of NRA Table of Contents)

Cluster	NRA Appendix	Science Program Element (see Appendix A)	NOI Due Date	Proposal Due Date	Relevant OSS Science Themes [1]			
					ASO	SEU	ESS	SEC
A.1	A.1.1	Sun-Earth Connection Theory	3/02/01	4/27/01				X
A.1	A.1.2	Sun-Earth Connection Guest Investigator	2/23/01	4/20/01				X
A.1	A.1.3	Living With a Star Targeted Research and Technology	7/18/01	9/19/01				X
A.1	A.1.4	Astrophysics Data	3/02/01	5/04/01	X	X	X	
A.1	A.1.5	Long-Term Space Astrophysics	3/02/01	5/04/01	X	X	X	
A.1	A.1.6	Astrophysics Theory	5/25/01	7/20/01	X	X		
A.2	A.2	Solar and Heliospheric Physics	6/22/01	8/24/01				X
A.3	A.3	Geospace Sciences [4]	5/02/01	6/22/01			X	X
A.4	A.4.1	Cosmochemistry [2]	3/23/01	5/18/01	X		X	
A.4	A.4.2	Planetary Geology and Geophysics [2]	3/09/01	5/10/01			X	
A.4	A.4.3	Origins of Solar Systems	3/30/01	6/01/01	X		X	
A.4	A.4.4	Mars Data Analysis	7/06/01	8/31/01			X	
A.5	A.4.5	Discovery Sample Return Lab. Instruments and Data Analysis	TBD	TBD	X		X	

A.5	A.5.1	Planetary Astronomy [2]	4/13/01	6/15/01	X		X	
A.5	A.5.2	Near Earth Object Observations	4/13/01	6/15/01	X		X	
A.5	A.5.3	Planetary Atmospheres [2]	2/23/01	4/20/01			X	
A.5	A.5.4	Planetary Suborbital Research	2/13/01	4/20/01			X	
A.6	A.6.1	Exobiology [2]	6/08/01	8/03/01	X		X	
A.6	A.6.2	Planetary Instrument Definition and Development	6/07/01	8/08/01			X	
A.6	A.6.3	Planetary Major Equipment [2]	See ESS Program Element of interest. [2]		X		X	
A.5	A.6.4	Astrobiology Science and Technology	9/14/01	11/09/01	X		X	
A.7	A.7	Space Astrophysics Research and Analysis [3]	4/06/01	6/21/01	X	X		
A.8	A.8.1	X-ray and Gamma-ray Astrophysics	2/23/01	4/06/01		X		
A.8	A.8.2	Cosmic Ray Astrophysics	2/23/01	4/06/01		X		
A.9	A.9.1	Applied Information Systems Research	7/27/01	9/26/01	X	X	X	X

[1] ASO: Astronomical Search for Origins; SEU: Structure and Evolution of the Universe; ESS: Solar System Exploration; SEC: The Sun-Earth Connection.

[2] The proposals for Planetary Major Equipment program element A.6.3 may be submitted in conjunction with program elements A.4.1: Cosmochemistry; A.4.2: Planetary Geology and Geophysics; A.5.1: Planetary Astronomy; A.5.3: Planetary Atmospheres; and A.6.1 Exobiology.

[3] The Space Astrophysics Research and Analysis cluster includes the following program elements that were separately identified in the ROSS-1998 and -1999 NRA's: Ultraviolet, Visible, and Gravitational Astrophysics; Infrared/Submillimeter/Radio/Interferometry Astronomy; Space Astrophysics Detectors; and Astrophysics Suborbital.

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